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A GENERAL METHOD OF EVALUATING DETERMINANTS

BY G. MACLOSKIE

THE method formerly published (*ANNALS OF MATHEMATICS*, January 1900, p. 74) may be further simplified if we start from the following theorems:

$$\begin{vmatrix} a & b & c & \dots & \dots \\ e & f & g & \dots & \dots \\ j & k & l & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \end{vmatrix} = \frac{1}{a^{n-1}} \begin{vmatrix} a & ab & ac & \dots & \dots \\ e & af & ag & \dots & \dots \\ j & ak & al & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \end{vmatrix} = \frac{1}{a^{n-2}} \begin{vmatrix} af - be & ag - ce & \dots & \dots \\ ak - bj & ab - cj & \dots & \dots \\ \dots & \dots & \dots & \dots \end{vmatrix}$$

We thus obtain the general rule:

1. Line off a superior border row and an anterior border column of the given determinant of order n .

2. Multiply the leading element a into the several elements of its minor, deducting from each product the product of the two border elements on the same row and column.

The results are the elements of a new determinant, which on being divided by a^{n-2} is equal to the original determinant.

We may often find it convenient to shift the lines so as to bring a unit element into the leading place. When zero appears in the leading place, shifting is necessary.

Example:

$$\begin{vmatrix} 2 & 7 & -2 & 8 \\ 4 & 1 & 1 & -3 \\ 0 & 3 & -1 & 4 \\ 6 & 4 & 2 & -8 \end{vmatrix} = \frac{1}{2^2} \begin{vmatrix} -26 & 10 & -38 \\ 6 & -2 & 8 \\ -34 & 16 & -64 \end{vmatrix} \\ = 2 \begin{vmatrix} 13 & -5 & 19 \\ 3 & -1 & 4 \\ 17 & -8 & 32 \end{vmatrix} = \frac{2}{13} \begin{vmatrix} 2 & -5 \\ -19 & 93 \end{vmatrix} = 14.$$